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ABSTRACT

Hawaii uses the eighth edition of the Stanford Achievement Test (Stanford 8) to assess academic performance of the student population in grades 3, 6, 8, and 10. Hawaii was not included in the norming for the Stanford 8, neither for the national nor the Pacific norms. In this study, Hawaii norms were developed based on the Stanford 8 reading and mathematics results from 1992 to 1996 to supplement the national norms and provide an additional means of comparison. Hawaii reading norms were lower at every grade level, especially grades 3 and 8. However, local mathematics norms showed Hawaii students exceeding national norms in the upper quartile on grades 3, 6, and 8. Hawaiian and national grade-10 mathematics norms were very similar. Average performance changes between grades were analyzed, and it was found that the longitudinal cohorts made greater gains in achievement from third to sixth and from eighth to tenth grades than national counterparts, while the sixth-to-eighth grade group made lesser gains. These norms provide tools to improve the understanding of Hawaii student performance relative to their mainland counterparts. (Contains 5 tables, 8 figures, and 26 references.) (Author/SLD)

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Creating Local Norms to Evaluate Students in a Norm-Referenced Statewide Testing Program

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Abstract

Hawaii uses the Stanford Achievement Test (Stanford 8) to assess academic performance of the student population in grades 3, 6, 8, and 10. Hawaii was not included in the norming for the Stanford Achievement Test 8th edition (Stanford 8), neither for the national nor the pacific norms. Hawaii norms were therefore developed based on the Stanford 8 reading and mathematics results from 1992 to 1996 to supplement the national norms and provide an additional means of comparison. Hawaii reading norms were lower at every grade level, especially grades 3 and 8. However, local mathematics norms showed Hawaii students exceeding national norms in the upper quartile in grades 3, 6, and 8. Hawaii and national grade 10 mathematics norms were very similar. Average performance changes between tested grades were analyzed. The longitudinal cohorts made greater gains in achievement from 3rd - 6th and 8th - 10th grades than the national counterparts, while the 6th - 8th grade group made lesser gains. These norms provide tools to improve the understanding of Hawaii student performance relative to their mainland counterparts.

Creating Local Norms to Evaluate Students in a Norm-Referenced Statewide Testing Program

Assessment of student achievement is required by legislation in many states.The Hawaii Department of Education mandates annual testing for all public school students in grades 3, 6, 8, and 10 unless specifically excluded from testing. The most widely used standardized tests are norm-referenced ones, which were developed to compare individual student performance to a representative national sample. The norm-referenced Stanford Achievement Test, 8th Edition (Stanford 8), published in 1992 by the Psychological Corporation, is generally the standardized instrument used to measure academic achievement in Hawaii. The Stanford 8 results can be reported in a variety of normed scores (e.g., stanines, percentiles, and scaled scores) for use in comparing students in the target group (Hawaii) with the norming group (Heim, 1994). Even though commentators have emphasized the shortcomings and questioned the validity of standardized tests, it is improbable that these tests will be discarded as assessment instruments (Crouse & Trusheim, 1989; Powell & Steelman, 1996) as they appear to be the most efficient, and relatively objective method of measuring student achievement.

There have been numerous controversies surrounding the use of norm-referenced tests in Hawaii (Aizawa, 1994; Chin-Chance, 1994; Heim, 1994; Paris, 1994). However, in order to consider the appropriateness of administering the Stanford 8, the purpose of the mandated assessment must be understood: to assess the performance of students. To assess the achievement of Hawaii public school students, their performance on the Stanford 8 is compared with the performance of other students and schools in the nation.

The Stanford 8 national norms are based upon a sample (n=175,000) of students assessed in 1991 (The Psychological Corporation, 1992). However, students in Hawaii's public schools were not included in the sample, neither in the pilot testing nor in the development of the national norms. The Psychological Corporation maintains that Hawaii's lack of representation in the national norming process does not significantly affect the national norms, as Hawaii's student population includes ethnic groups that comprise only 1-2% of the United States' student population (J. Mayo, personal communication, September, 1994). Moreover, when Stanford 8 norms were developed for the Pacific region, students in American Samoa, Guam, and CNMI were included but students in Hawaii were not (M. Turituri, personal communication, October 23, 1996).

It is often advantageous for a state or school district to develop special norms to supplement the national norms, which may be inadequate for the local setting, to provide an additional means of comparison (Nunnally, 1972; Petersen, Kolen, & Hoover, 1989; Brown & Bryant, 1984). Brown and Bryan recommend the development of local norms when there are significant differences in characteristics of ethnicity, gender, achievement performance, or age between the local population and the normative group. The typical characteristics of Hawaii's public school students warrant the development of local norms.

Rationale for Development of Local Norms in Hawaii.

Ethnicity. Unlike the rest of the contiguous states, the ethnicity of the public school population in Hawaii is approximately 23% Caucasian, 4 % Hispanic, .4% African American, 21% Native Hawaiian and Part Hawaiian, 34% Asian, and 18% other (Chin-Chance, Gronna, & Jenkins, 1996a). The Stanford 8 norms, however, were developed using a representative national

sample of 72% Caucasian, 7% Hispanic, 15% African American, and 5% other ethnicity (The Psychological Corporation, 1992b). Studies have linked achievement in Hawaii to ethnicity (Brandon, 1984; Educational Testing Service, 1993; Gallimore, Boggs, & Jordan, 1974). The national norms therefore do not reflect Hawaii's multicultural student population and achievement.

Gender. The achievement pattern in mathematics is atypical for boys and girls in Hawaii (Brandon, Jordan, & Higa, 1995; Kiplinger, 1996). The Total Reading and Total Mathematics "dimensions" of the Stanford 8 are computed based on the scores of several subtests in each area. Hawaii is the only large school district in the United States where girls outperform boys in Stanford 8 Total Reading and Total Mathematics at all grade levels (Liskum & Chin-Chance, 1996).

Achievement. Unlike the national average (10.4%), Hawaii has a higher (19%), proportion of students enrolled in private schools (Lai, Saka, & Chin-Chance, 1994). Research indicates that private school students who once attended public schools in Hawaii typically score in the above average range of achievement (Lai, et al., 1994). Furthermore, 12.9 % of the tested student population in Hawaii is comprised of special education students (Chin-Chance, Gronna, & Jenkins, 1996b). Studies have indicated that students with disabilities typically score in the below average range of achievement (Gronna, Jenkins, & Chin-Chance, 1996). The Stanford 8 normative sample only includes 4.9% special education students (The Psychological Corporation, 1992a). When Hawaii is compared to the nation, the normative sample includes more "bright" students who are not attending private schools and fewer students with disabilities.

Age. Hawaii is one of eight states maintaining late entrance admission (December 1 to January 1) cut-off dates (Liskum & Chin-Chance, 1996). Hawaii has more "younger" students within each grade than other states. Younger children are usually at an academic disadvantage when compared to older classmates (Crosser, 1991). Liskum and Chin-Chance found a relationship between age and Stanford 8 test scores in Hawaii at all tested grades. Children born in the last three months of the year, had statistically significant lower achievement scores than their older peers. Liskum and Chin-Chance (1996) suggest that Hawaii is at relative disadvantage in norm-referenced comparisons with other states, because the Stanford 8 normative sample was based on an older population.

Purpose of study

This study sought to analyze the standardized test score data for students within Hawaii in order to profile their achievement. We hypothesized that the overall test performance of students within Hawaii is different from the mainland population. This study developed local or state-wide norms for public school students taking the Stanford 8 in grades 3, 6, 8, and 10 based on cross-sectional data from 1992 to 1996 in order to assess performance of these students. A longitudinal analysis was conducted to develop a sense of typical changes in reading and mathematics based on the Stanford 8.

Method

The Hawaii Department of Education, Test Development Section of the Planning and Evaluation Group maintains an extensive student identity database on all public school students that includes ethnicity, home language, age, and gender. The Stanford 8 results have been stored in annual databases. The student identity and Stanford 8 databases for 1992 through 1996 (n =

247,817) were used for analysis. During this period, approximately 68,679 grade 3 students, 66,553 grade 6 students, 60,400 grade 8 students, and 51,185 grade 10 students were assessed using the Stanford 8.

Procedure

Development of Hawaii Norms based on Cross-Sectional Data. Using Microsoft Access (Microsoft, 1995) the individual student records (N = 1,069,500) in the 1992 to 1996 demographic databases were disaggregated into tested grades and linked by student identification numbers to the Stanford 8 databases. The cross-sectional data from 1992 and 1996 were combined to provide more stable benchmarks. Of these, all Total Reading student scaled scores and Total Mathematics scaled scores in grades 3, 6, 8, and 10 were used to develop Hawaii norms for the test dimensions at each tested grade level. The Stanford 8 scaled scores represent approximately equal units in learning on a continuous scale from 1 to 999 and facilitate the conversion into other score types that are suitable for studying the change in performance over time (The Psychological Corporation, 1992a). Descriptive statistics and frequency distributions of scores within tested grades were calculated using SPSS 7.0 for Windows 95 (SPSS, 1996). From these data, tentative Hawaii percentile rank norms were constructed.

National normative data were compiled from the technical data reports for the Stanford 8 (The Psychological Corporation, 1992). The normative data for scaled scores and percentiles were published in the "look-up" tables by administration data and test form. The means and standard deviations of the scaled scores of the combined spring standardization sample and number of students included in the sample were published in National technical reports (The Psychological Corporation, 1992). The mean scores for the combined Spring standardization

sample may vary from specific values found in the "look-up" tables due to slight differences between test forms. The mean scaled scores for Total Reading and Total Mathematics dimensions were determined from the Stanford 8 technical reports and were identified as the nationally normed scaled score at the 50th percentile rank for each grade. The arithmetic differences between national means at sequential grades were computed to determine the national average scaled score increases per grade level and test dimension.

Changes in Scaled Scores Between Grades Based on Longitudinal Data. To develop longitudinal cohorts, the student identity and Stanford 8 data bases were further linked to test results at an earlier grade. The longitudinal analysis was based on two 3rd to 6th grade cohorts (n = 20,826). Cohort A included 3rd grade students in 1992 and 6th grade students in 1995 (na = 10,429). Cohort B included 3rd grade students in 1993 and 6th grade students in 1996 (nb = 10,397). Three 6th to 8th grade cohorts (n = 29,948) were included. Cohort C included 6th grade students in 1992 and 8th grade students in 1994 (nc = 9,781). Cohort D included 6th grade students in 1993 and 8th grade students in 1995 (nd = 9,980). Cohort E included 6th grade students in 1994 and 8th grade students in 1996 (ne =10,187). Finally, three 8th to 10th grade cohorts were included in the longitudinal analysis (n = 23,683). Cohort F included 8th grade students in 1992 and 10th grade students in 1994 (nf = 7,886). Cohort G included 8th grade students in 1993 and 10th grade students in 1995 (ng = 7,823). Cohort H included 8th grade students in 1994 and 10th grade students in 1996 (nh = 7,974).

The cohorts data were aggregated by grade grouping to provide more stable benchmarks. To study the changes between the tested grades the Psychological Corporation scaled scores were

used as they adequately represent approximately equal units on a continuous scale and are equivalent across test forms and test levels (The Psychological Corporation, 1992b).

Hawaii scaled score mean increases were determined for each longitudinal cohort's Total Reading and Total Mathematics dimensions. The associated scaled score corresponding to the 50th percentile rank of the frequency distribution was identified at each grade level and dimension. The arithmetic difference between Hawaii means at sequential grades were computed to determine the Hawaii average scaled score increases per cohort and test dimension.

Results

Tables 1 and 2 represents the descriptive statistics, means, and standard deviations for Stanford 8 Total Reading and Total Mathematics scaled scores for each Hawaii grade level based on the cross-sectional data. Hawaii means and standard deviations for test dimensions are different from the national norms at each grade level. The Total Mathematics kurtosis (.910 to -.145) and skewness (.817 to .390) and Total Reading kurtosis (-.405 to .116) and skewness (.293 to .468) for each Hawaii frequency distribution of scores are represented by grade in Table 3. The distribution of scores is generally positively skewed. The distribution of the Hawaii scaled scores does not fall along the normal distribution of the Stanford 8 scaled scores for the Total Reading and Total Mathematics dimensions.

Tentative Hawaii percentile rank norms were constructed for grades 3, 6, 8, and 10 from the scores of all students who took the Stanford 8 in a standardized manner. These norms include students with disabilities and have a fairly equal representation of male and female students (e.g., males: 51%, 50.5%, 51.2% and 50.1% for grades 3, 6, 8, and 10, respectively). Figures 1 through

8 compare Hawaii percentile rank norms to national norms for reading and mathematics dimensions.

The reading performance gap between the Hawaii and national norms is the greatest at grades 3 (14 to 20 scaled score points) and 8 (10 to 16 scaled score points). Smaller performance gaps are noted for grades 6 and 10. The performance gap is not consistent across all performance levels. For grades 3, 6, and 10 the largest differences occur in the mid-range while grade 8 Hawaii students demonstrate the most severe gap in the lower half of the performance range.

Hawaii mathematics performance indicates relatively small differences (3 to 6 scaled score points) when compared to national norms. In grades 3, 6, and 8, Hawaii students perform better than their national counterparts in the upper quartile range and less well in the middle quartiles. At grade 10, the national normative group performs better at almost every level, but only at a very small amount (3 to 4 scales score points).

Average scaled score values were further analyzed to ascertain the average changes in scaled scores between grades based on a longitudinal analysis the data. Between 3rd and 6th grades the Hawaii group increased an average of 11 Total Reading and 14 Total Mathematics scaled score points above the national norm. However, between 6th and 8th grades, the Hawaii group gained 2 scaled score points less in Total Reading and 16 points less in Total Mathematics dimensions. Between 8th and 10th grade, Hawaii students increased an average of two scaled score points above the national group in Total Reading and exhibited equal scaled score increases in Total Mathematics when compared to the gains made nationally (see Tables 4 and 5).

Discussion

The primary purpose of this study was to analyze the standardized test score data for students within Hawaii in order to evaluate academic performance within the state. Statewide norms for Hawaii's public school students were developed by grade level in order to provide an indicator of Hawaii "normal" performance. By developing local norms, students in Hawaii are being compared to the performance of a more relevant heterogeneous population.

Closer inspection of the Hawaii norms reveal that at all four grades tested, Hawaii students do not perform on par with the national normative group. Hawaii students fail to perform on par in reading with their national counterparts, yet are relatively equivalent in mathematics performance. Hawaii reading norms were lower at every grade level, especially grades 3 and 8. However, Hawaii mathematics norms showed Hawaii students exceeding national norms in the upper quartile in grade 3, 6, and 8. Hawaii and national grade 10 mathematics norms were very similar. In mathematics, Hawaii students generally perform much closer to their national counterparts.

The longitudinal cohorts made greater gains in achievement from 3rd - 6th and 8th -10th grades than their national counterparts, while the 6th - 8th grade group made lesser gains. It is interesting that while gains between grade 6 and 8 are not as substantial as the national normative gains between these years, the grade 3 and 6 cohorts as well as grade 8 and 10 cohorts increase or remain equivalent to national normative performance achievement. These findings are compatible with previous research (Chin-Chance, et al., 1996a; Gronna, et al., 1996; Lai, et al., 1994). The variables that can account for the increase or decrease in Stanford 8 reading scores have not yet been identified nor evaluated. Perhaps the differences in scores between grades

could be related to school philosophies, perceived self-efficacy, students' background characteristics, motivation, or gender.

Since the results of our study are based on the entire public school population at targeted grades, the differences reported must be viewed in terms of educational significance rather than statistical significance. Undoubtedly the grade 3 to 6 cohort differences are large enough to represent relative large changes in relative rankings between Hawaii and national norms while the two to three point differences in the grade 8 to 10 cohort would represent relative minor changes in relative rankings. These analysis and norms provide additional tools to improve the understanding of Hawaii student performance relative to their mainland counterparts.

Summary

There are four important features to use when examining norms: (a) the types of derived scores that are reported, (b) the demographic representativeness of the normative sample, (c) the size of the normative group, and (d) the recency of test standardization (Wallace, Larsen, & Elskin, 1992). One must be wary of comparing the results of students in Hawaii, who take the Stanford 8, to the national norm. The Hawaii "norms" developed in this study more accurately reflect the demographic student characteristics of Hawaii's public school students than the national or Pacific region norms. The Hawaii norms are based on a population much larger than the Stanford 8 sample, and are more current.

The Hawaii norms can provide additional information about how well individual students are performing in comparison to students who are similar to them on important characteristics such as gender, ethnicity, and age. The Hawaii norms could be used to further identify the influence of gender and age on achievement measured by the Stanford 8. The possible finding

could influence school entrance age requirements, curriculum, and teaching styles. The Hawaii norms could be additionally compared to the Stanford 8 norms of the Pacific region for further evaluation of achievement within the Pacific basin. Use of these norms do not imply that the more traditional norms are incorrect. It should be viewed from the standpoint that these norms provide additional interpretive tools for understanding students performance in Hawaii.

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Table 1

Total Reading Scaled Scores for Stanford Achievement Test 8: 1992- 1996

	Hawaii				Natio	
	M	SD	n	SD	n	n
					M	
Third	590	38	65,866	40	611	9,617
Sixth	642	34	65,218	38	656	9,870
Eighth	661	36	58,033	36	676	8,711
Tenth	679	35	47,157	36	688	6,491

Note. The mean scores for the combined Spring standardization sample may vary from specific values found in the "look-up" tables due to slight differences between test forms.

Table 2

Total Mathematics Scaled Scores for Stanford Achievement Test 8: 1992- 1996

	Hawaii				Natio	
	M	SD	n	SD	n	n
					M	
Third	596	43	66,623	40	596	9,636
Sixth	657	37	64,978	39	663	9,792
Eighth	683	39	57,473	39	690	8,671
Tenth	707	44	48,028	44	705	6,440

Note. The mean scores for the combined Spring standardization sample may vary from specific values found in the "look-up" tables due to slight differences between test forms.

Table 3

Kurtosis and Skewness for Frequency Distributions of Scaled Scores in Hawaii

	Total Reading		Total Mathematics	
Grade	Kurtosis	Skewness	Kurtosis	Skewness
Third	-.407	.334	-.145	.390
Sixth	-.193	.333	.282	.656
Eighth	.116	.468	.588	.817
Tenth	-.225	.293	.910	.801

Table 4

Mean Total Reading Scaled Score Differences for Selected Cohorts.

	Grade 3 to 6			Grade 6 to 8			Grade 8 to 10		
	3	6	Δ	6	8	Δ	8	10	Δ
Hawaii	591	643	52	640	662	22	666	680	14
National sample (Typical)	608	649	41	649	673	24	673	685	12

Table 5

Mean Total Mathematics Scaled Score Differences for Selected Cohorts.

	Grade 3 to 6			Grade 6 to 8			Grade 8 to 10		
	3	6	Δ	6	8	Δ	8	10	Δ
Hawaii	598	658	60	657	685	28	690	710	20
National sample (Typical)	594	640	46	640	684	44	684	704	20

Figure 1. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for third grade Total Mathematics.

Figure 2. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for third grade Total Reading.

Figure 3. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for sixth grade Total Mathematics.

Figure 4. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for sixth grade Total Reading.

Figure 5. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for eighth grade Total Mathematics.

Figure 6. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for eighth grade Total Reading.

Figure 7. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for tenth grade Total Mathematics.

Figure 8. Comparison of Hawaii (local) and national scaled scores of the Stanford 8 for tenth grade Total Reading.

Hawaii Local Norm -3rd Grade Total Mathematics								National Norm -3rd GradeTotal Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	458	26	565	51	594	76	627	1	511	26	567	51	595	76	624
2	527	27	566	52	595	77	628	2	518	27	569	52	596	77	625
3	530	28	567	53	596	78	630	3	521	28	570	53	597	78	626
4	531	29	568	54	597	79	632	4	525	29	571	54	598	79	627
5	535	30	569	55	598	80	633	5	529	30	572	55	599	80	628
6	536	31	570	56	600	81	635	6	531	31	574	56	600	81	629
7	537	32	572	57	601	82	636	7	533	32	575	57	601	82	631
8	538	33	573	58	602	83	638	8	535	33	576	58	602	83	633
9	540	34	574	59	603	84	640	9	538	34	577	59	603	84	635
10	542	35	575	60	604	85	642	10	540	35	578	60	604	85	637
11	543	36	576	61	605	86	644	11	542	36	580	61	605	86	638
12	545	37	577	62	607	87	646	12	543	37	581	62	607	87	639
13	547	38	579	63	608	88	648	13	545	38	582	63	608	88	641
14	548	39	580	64	609	89	650	14	548	39	583	64	609	89	644
15	550	40	582	65	611	90	653	15	550	40	584	65	610	90	646
16	551	41	583	66	612	91	654	16	551	41	585	66	611	91	648
17	553	42	584	67	613	92	657	17	554	42	586	67	613	92	651
18	554	43	585	68	616	93	661	18	555	43	587	68	614	93	654
19	555	44	586	69	617	94	665	19	557	44	588	69	615	94	657
20	557	45	587	70	618	95	670	20	559	45	589	70	616	95	663
21	558	46	588	71	619	96	675	21	560	46	590	71	618	96	667
22	559	47	589	72	620	97	681	22	562	47	591	72	619	97	671
23	560	48	590	73	622	98	687	23	563	48	592	73	620	98	679
24	562	49	591	74	624	99	702	24	565	49	593	74	621	99	685
25	563	50	592	75	625	100	778	25	566	50	594	75	623	100	778

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.
National norm ©1991 The Psychological Corporation.

Hawaii Local Norm -3rd Grade Total Reading								National Norm -3rd GradeTotal Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	474	26	561	51	589	76	619	1	539	26	579	51	609	76	637
2	528	27	562	52	590	77	620	2	541	27	581	52	610	77	639
3	529	28	563	53	592	78	621	3	544	28	582	53	611	78	640
4	533	29	564	54	593	79	623	4	546	29	583	54	612	79	641
5	534	30	565	55	594	80	624	5	548	30	585	55	613	80	643
6	536	31	567	56	595	81	626	6	550	31	586	56	614	81	644
7	537	32	568	57	596	82	627	7	552	32	587	57	615	82	645
8	539	33	569	58	597	83	629	8	554	33	589	58	616	83	647
9	540	34	570	59	598	84	631	9	556	34	590	59	617	84	648
10	541	35	572	60	599	85	632	10	557	35	591	60	618	85	650
11	542	36	573	61	600	86	634	11	559	36	593	61	619	86	652
12	543	37	574	62	601	87	636	12	560	37	594	62	620	87	654
13	545	38	575	63	602	88	638	13	561	38	595	63	621	88	655
14	546	39	576	64	603	89	640	14	562	39	596	64	622	89	657
15	547	40	577	65	604	90	642	15	563	40	597	65	623	90	660
16	549	41	578	66	606	91	644	16	565	41	599	66	625	91	663
17	550	42	580	67	607	92	647	17	567	42	599	67	626	92	666
18	551	43	581	68	608	93	650	18	569	43	601	68	627	93	669
19	552	44	582	69	610	94	652	19	570	44	602	69	628	94	672
20	554	45	583	70	611	95	656	20	571	45	603	70	630	95	676
21	555	46	584	71	612	96	660	21	573	46	604	71	631	96	680
22	556	47	585	72	613	97	666	22	574	47	605	72	632	97	685
23	557	48	586	73	615	98	672	23	575	48	606	73	633	98	690
24	558	49	587	74	616	99	681	24	577	49	607	74	635	99	703
25	559	50	588	75	617	100	784	25	578	50	608	75	636	100	784

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.

Hawaii Local Norm -6th Grade Total Mathematics								National Norm -6th GradeTotal Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	546	26	629	51	653	76	682	1	576	26	630	51	655	76	682
2	598	27	630	52	654	77	683	2	579	27	631	52	656	77	683
3	602	28	631	53	655	78	685	3	587	28	632	53	657	78	685
4	604	29	632	54	656	79	686	4	591	29	633	54	658	79	686
5	605	30	633	55	657	80	688	5	594	30	634	55	659	80	688
6	606	31	634	56	658	81	690	6	596	31	635	56	660	81	689
7	608	32	635	57	659	82	691	7	600	32	636	57	661	82	691
8	609	33	636	58	660	83	693	8	602	33	637	58	662	83	693
9	611	34	637	59	661	84	695	9	604	34	638	59	663	84	694
10	612	35	638	60	662	85	697	10	605	35	639	60	664	85	696
11	613	36	639	61	663	86	700	11	607	36	640	61	665	86	698
12	615	37	639	62	664	87	702	12	609	37	641	62	666	87	699
13	616	38	640	63	665	88	704	13	612	38	642	63	667	88	700
14	617	39	641	64	666	89	706	14	614	39	643	64	668	89	702
15	618	40	642	65	668	90	709	15	615	40	644	65	669	90	706
16	619	41	643	66	669	91	712	16	617	41	645	66	670	91	708
17	620	42	644	67	670	92	715	17	618	42	646	67	671	92	710
18	621	43	645	68	671	93	717	18	620	43	647	68	672	93	714
19	622	44	646	69	672	94	721	19	622	44	648	69	673	94	717
20	623	45	647	70	674	95	725	20	623	45	649	70	674	95	719
21	624	46	648	71	675	96	731	21	624	46	650	71	676	96	725
22	625	47	649	72	676	97	737	22	625	47	651	72	677	97	731
23	626	48	650	73	677	98	745	23	626	48	652	73	678	98	741
24	627	49	651	74	679	99	756	24	628	49	653	74	679	99	745
25	628	50	652	75	680	100	848	25	629	50	654	75	680	100	848

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.

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Hawaii Local Norm -6th Grade Total Reading								National Norm -6th GradeTotal Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	532	26	616	51	640	76	666	1	585	26	624	51	650	76	675
2	581	27	617	52	641	77	667	2	587	27	625	52	651	77	676
3	585	28	618	53	642	78	668	3	591	28	627	53	652	78	677
4	587	29	619	54	643	79	669	4	593	29	628	54	653	79	679
5	589	30	621	55	644	80	671	5	595	30	629	55	654	80	680
6	591	31	622	56	645	81	673	6	597	31	630	56	655	81	682
7	593	32	623	57	646	82	674	7	599	32	631	57	656	82	683
8	594	33	624	58	647	83	675	8	601	33	632	58	657	83	684
9	596	34	625	59	648	84	677	9	603	34	633	59	658	84	685
10	597	35	626	60	649	85	679	10	604	35	634	60	659	85	687
11	599	36	626	61	650	86	680	11	606	36	635	61	660	86	688
12	600	37	627	62	651	87	681	12	607	37	636	62	661	87	690
13	602	38	628	63	652	88	683	13	608	38	637	63	662	88	691
14	603	39	629	64	653	89	685	14	610	39	638	64	663	89	693
15	604	40	630	65	654	90	687	15	611	40	639	65	664	90	696
16	605	41	631	66	655	91	689	16	612	41	640	66	665	91	698
17	606	42	632	67	656	92	692	17	613	42	641	67	666	92	699
18	607	43	633	68	657	93	694	18	615	43	642	68	667	93	703
19	608	44	634	69	658	94	696	19	616	44	643	69	668	94	706
20	610	45	635	70	659	95	699	20	617	45	644	70	669	95	710
21	611	46	636	71	660	96	703	21	618	46	645	71	670	96	715
22	612	47	637	72	661	97	709	22	619	47	646	72	671	97	719
23	613	48	638	73	662	98	715	23	620	48	647	73	672	98	725
24	614	49	639	74	663	99	725	24	622	49	648	74	673	99	731
25	615	50	639	75	664	100	819	25	623	50	649	75	674	100	819

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.
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Hawaii Local Norm -8th Grade Total Mathematics								National Norm -8th Grade Total Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	572	26	654	51	677	76	709	1	603	26	661	51	685	76	712
2	627	27	655	52	678	77	710	2	606	27	662	52	686	77	713
3	628	28	656	53	679	78	712	3	614	28	663	53	687	78	714
4	630	29	657	54	680	79	713	4	619	29	664	54	688	79	715
5	631	30	658	55	681	80	715	5	624	30	665	55	689	80	717
6	633	31	659	56	682	81	717	6	628	31	666	56	690	81	718
7	634	32	660	57	684	82	719	7	630	32	667	57	691	82	720
8	636	33	661	58	685	83	721	8	634	33	668	58	692	83	722
9	637	34	662	59	686	84	723	9	636	34	669	59	693	84	723
10	638	35	663	60	687	85	725	10	639	35	670	60	694	85	725
11	639	36	664	61	688	86	727	11	641	36	671	61	695	86	727
12	640	37	665	62	689	87	730	12	643	37	672	62	696	87	728
13	641	38	665	63	690	88	733	13	644	38	673	63	697	88	730
14	642	39	666	64	691	89	736	14	646	39	674	64	698	89	732
15	643	40	667	65	693	90	738	15	648	40	675	65	699	90	734
16	644	41	668	66	694	91	740	16	649	41	676	66	700	91	736
17	645	42	669	67	696	92	744	17	651	42	677	67	701	92	740
18	646	43	670	68	697	93	748	18	652	43	678	68	702	93	742
19	647	44	670	69	698	94	752	19	653	44	679	69	703	94	744
20	648	45	671	70	699	95	757	20	654	45	680	70	704	95	749
21	649	46	672	71	700	96	763	21	656	46	681	71	705	96	754
22	650	47	673	72	702	97	770	22	657	47	682	72	706	97	760
23	651	48	674	73	704	98	778	23	658	48	682	73	708	98	770
24	652	49	675	74	705	99	793	24	659	49	683	74	709	99	773
25	653	50	676	75	707	100	880	25	660	50	684	75	710	100	880

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.

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Hawaii Local Norm -8th Grade Total Reading								National Norm -8th GradeTotal Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	515	26	634	51	659	76	686	1	614	26	650	51	674	76	697
2	598	27	635	52	660	77	687	2	616	27	651	52	674	77	698
3	602	28	636	53	661	78	688	3	618	28	652	53	675	78	699
4	605	29	637	54	662	79	689	4	620	29	653	54	676	79	701
5	607	30	638	55	662	80	691	5	622	30	654	55	677	80	703
6	609	31	639	56	663	81	692	6	624	31	655	56	677	81	704
7	610	32	641	57	664	82	693	7	625	32	656	57	678	82	706
8	612	33	642	58	665	83	695	8	627	33	657	58	679	83	707
9	613	34	643	59	666	84	697	9	629	34	658	59	680	84	709
10	615	35	644	60	667	85	700	10	631	35	659	60	681	85	710
11	617	36	645	61	669	86	701	11	632	36	660	61	682	86	712
12	618	37	646	62	670	87	703	12	634	37	661	62	683	87	713
13	620	38	647	63	671	88	705	13	636	38	662	63	684	88	715
14	621	39	648	64	671	89	708	14	637	39	663	64	685	89	717
15	622	40	649	65	672	90	709	15	638	40	664	65	686	90	719
16	623	41	650	66	673	91	712	16	639	41	665	66	687	91	721
17	624	42	651	67	674	92	714	17	641	42	666	67	688	92	723
18	625	43	651	68	676	93	717	18	642	43	667	68	689	93	724
19	626	44	652	69	677	94	721	19	643	44	668	69	690	94	727
20	627	45	653	70	678	95	724	20	644	45	669	70	691	95	731
21	629	46	654	71	679	96	728	21	645	46	670	71	692	96	736
22	630	47	655	72	680	97	736	22	646	47	671	72	693	97	741
23	631	48	656	73	681	98	743	23	647	48	672	73	694	98	747
24	632	49	657	74	683	99	754	24	648	49	672	74	695	99	754
25	633	50	658	75	684	100	835	25	649	50	673	75	696	100	835

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.
National norm ©1991 The Psychological Corporation.

Hawaii Local Norm -10th Grade Mathematics								National Norm -10th Grade Mathematics							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	563	26	676	51	702	76	732	1	613	26	680	51	705	76	739
2	638	27	677	52	703	77	735	2	621	27	681	52	706	77	741
3	639	28	678	53	704	78	736	3	629	28	682	53	707	78	743
4	644	29	679	54	705	79	739	4	636	29	682	54	708	79	745
5	646	30	680	55	706	80	740	5	641	30	684	55	709	80	747
6	649	31	682	56	707	81	742	6	645	31	685	56	710	81	749
7	652	32	683	57	708	82	744	7	648	32	686	57	711	82	751
8	655	33	684	58	709	83	746	8	651	33	687	58	713	83	753
9	656	34	685	59	710	84	749	9	653	34	688	59	714	84	755
10	658	35	686	60	711	85	752	10	655	35	689	60	715	85	757
11	659	36	687	61	712	86	754	11	657	36	690	61	716	86	759
12	660	37	688	62	713	87	757	12	659	37	691	62	718	87	761
13	663	38	689	63	714	88	759	13	661	38	692	63	719	88	763
14	664	39	690	64	715	89	761	14	662	39	693	64	720	89	766
15	664	40	691	65	716	90	765	15	664	40	694	65	722	90	769
16	665	41	692	66	717	91	768	16	666	41	695	66	723	91	772
17	667	42	693	67	718	92	771	17	667	42	696	67	724	92	776
18	668	43	694	68	720	93	776	18	669	43	697	68	726	93	780
19	669	44	695	69	722	94	779	19	670	44	698	69	727	94	785
20	671	45	696	70	724	95	787	20	672	45	699	70	729	95	790
21	672	46	697	71	725	96	795	21	673	46	700	71	730	96	796
22	673	47	698	72	726	97	803	22	675	47	702	72	732	97	803
23	674	48	699	73	728	98	814	23	676	48	702	73	733	98	812
24	674	49	699	74	729	99	847	24	677	49	703	74	735	99	813
25	675	50	670	75	730	100	878	25	679	50	704	75	737	100	878

Note. Not all percentile ranks have a unique associated scaled score due to the distribution of the scores.
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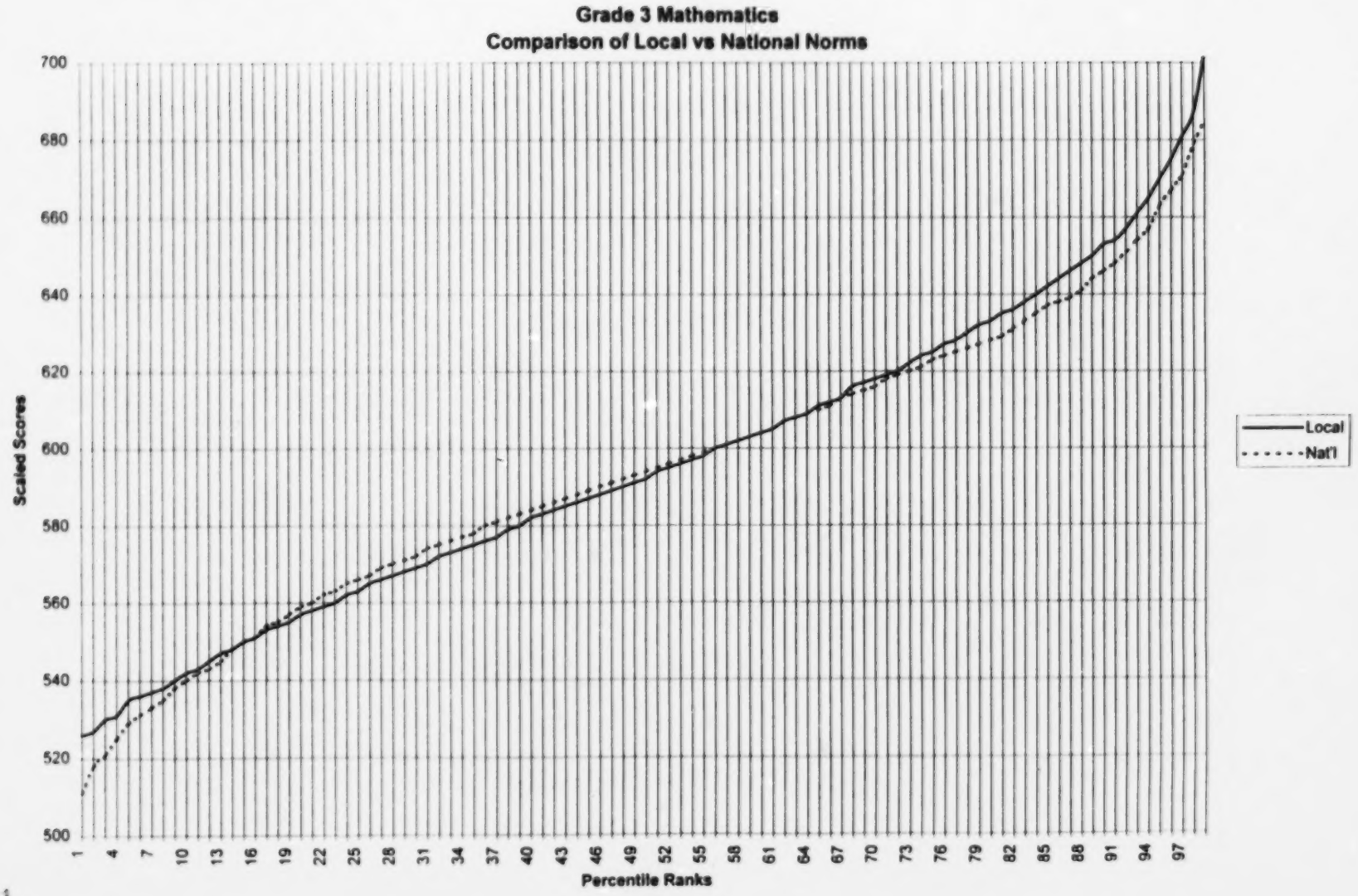
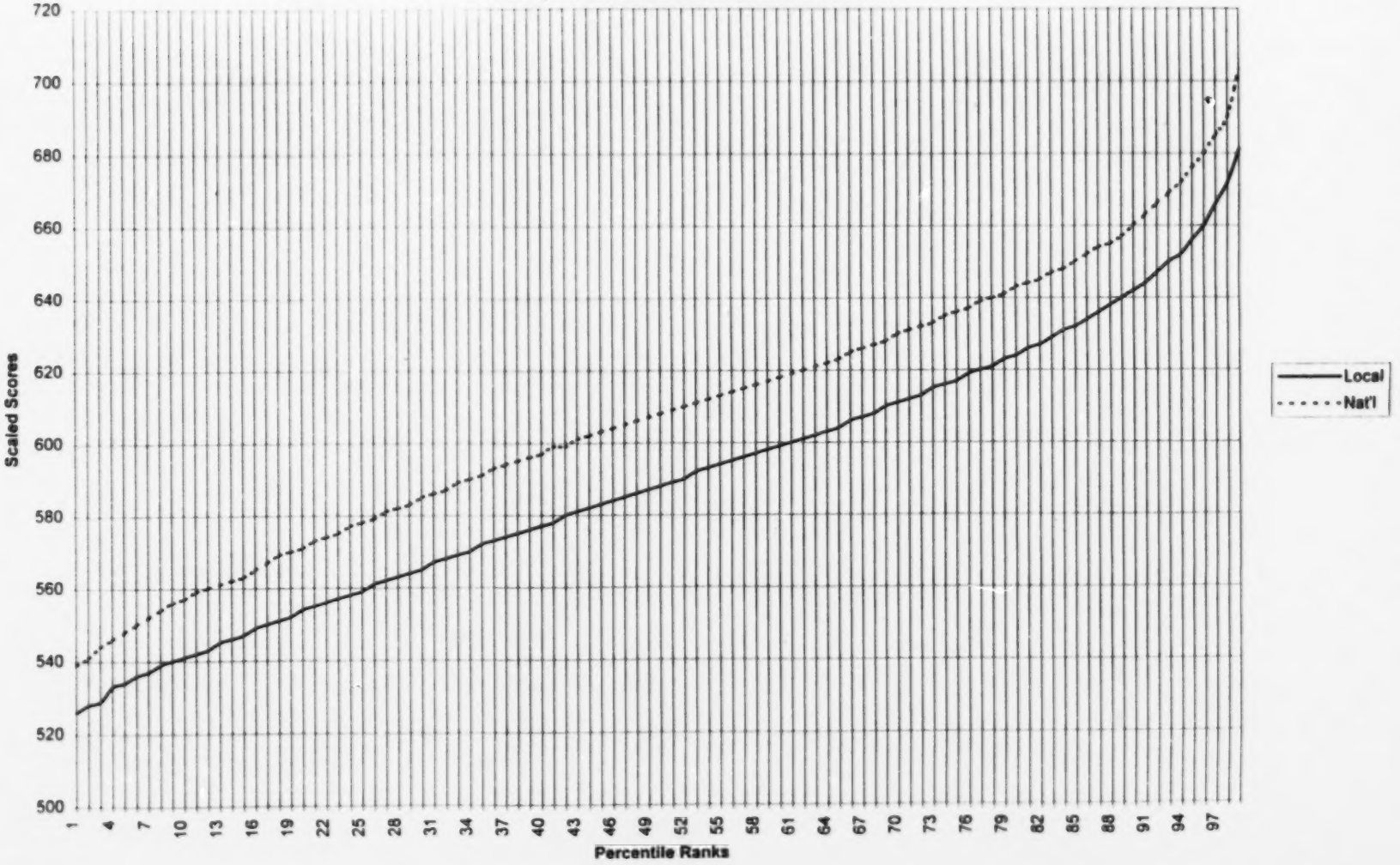
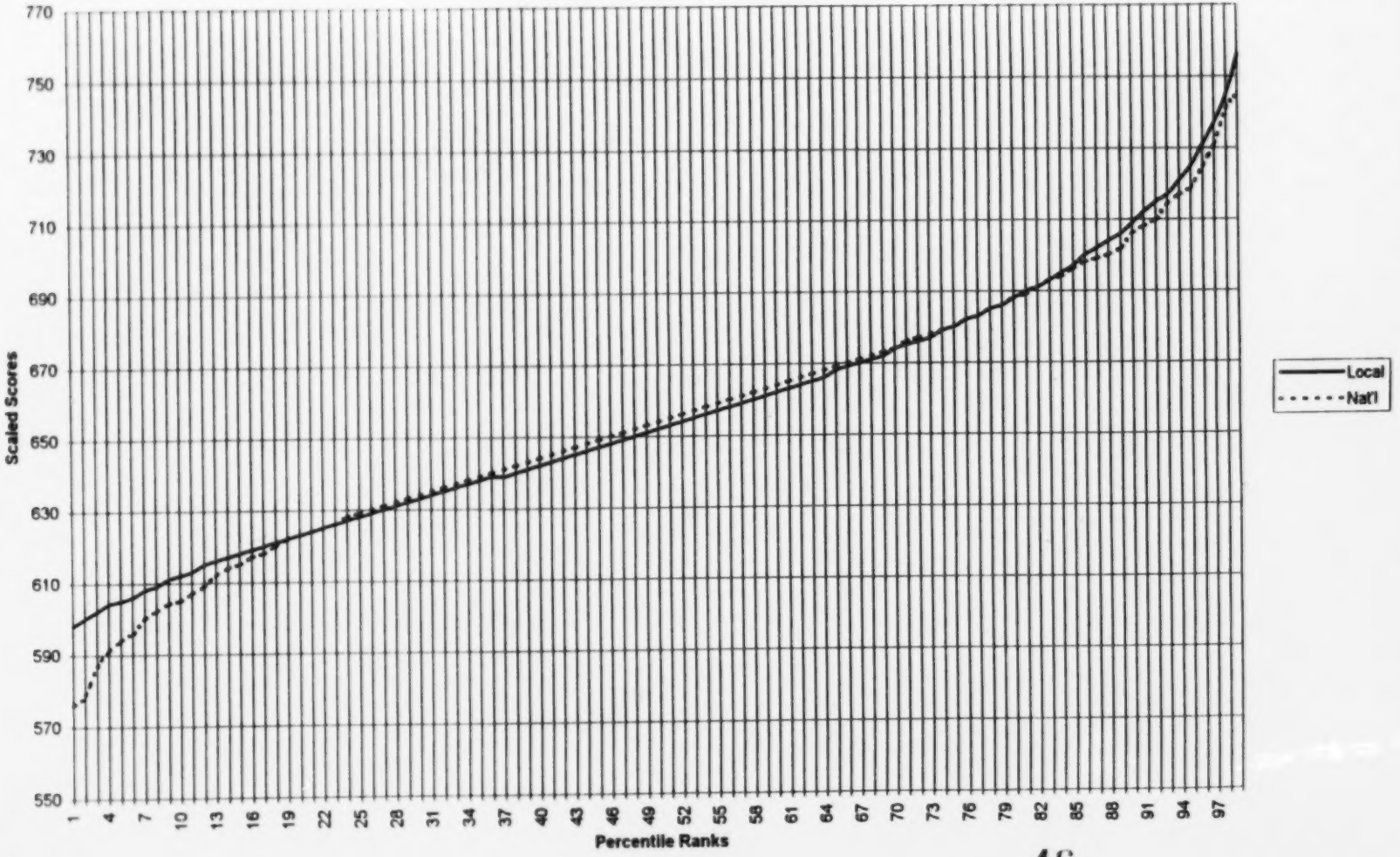
Hawaii Local Norm -10th GradeTotal Reading								National Norm -10th Grade Total Reading							
%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS	%tile	SS
1	531	26	653	51	677	76	704	1	621	26	661	51	686	76	710
2	616	27	654	52	678	77	705	2	624	27	662	52	686	77	711
3	620	28	655	53	679	78	706	3	627	28	663	53	687	78	712
4	622	29	656	54	680	79	707	4	629	29	664	54	688	79	713
5	625	30	657	55	681	80	708	5	631	30	665	55	689	80	715
6	627	31	658	56	682	81	710	6	633	31	666	56	690	81	716
7	629	32	659	57	683	82	712	7	635	32	667	57	691	82	717
8	631	33	660	58	684	83	713	8	637	33	668	58	692	83	719
9	633	34	661	59	685	84	715	9	639	34	669	59	693	84	720
10	634	35	662	60	686	85	716	10	640	35	670	60	694	85	722
11	635	36	663	61	687	86	717	11	642	36	671	61	695	86	723
12	637	37	664	62	688	87	720	12	643	37	672	62	696	87	725
13	638	38	666	63	689	88	721	13	645	38	673	63	697	88	727
14	640	39	667	64	690	89	724	14	646	39	674	64	698	89	729
15	641	40	667	65	691	90	726	15	648	40	675	65	699	90	731
16	642	41	668	66	692	91	727	16	649	41	676	66	700	91	733
17	644	42	669	67	693	92	730	17	650	42	677	67	701	92	735
18	645	43	670	68	694	93	732	18	652	43	678	68	702	93	738
19	646	44	671	69	695	94	735	19	653	44	679	69	703	94	741
20	647	45	672	70	696	95	738	20	654	45	680	70	704	95	745
21	648	46	672	71	697	96	742	21	655	46	681	71	705	96	749
22	649	47	673	72	698	97	746	22	657	47	682	72	706	97	754
23	650	48	674	73	699	98	755	23	658	48	683	73	707	98	755
24	651	49	675	74	701	99	762	24	659	49	684	74	708	99	761
25	652	50	676	75	703	100	855	25	660	50	685	75	709	100	855


Grade 3 Mathematics
Comparison of Local vs National Norms
Scaled Scores
700
680
660
640
620
600
580
560
540
520
500
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58
61
64
67
70
73
76
79
82
85
88
91
94
97
Percentile Ranks
Local
Nat'l

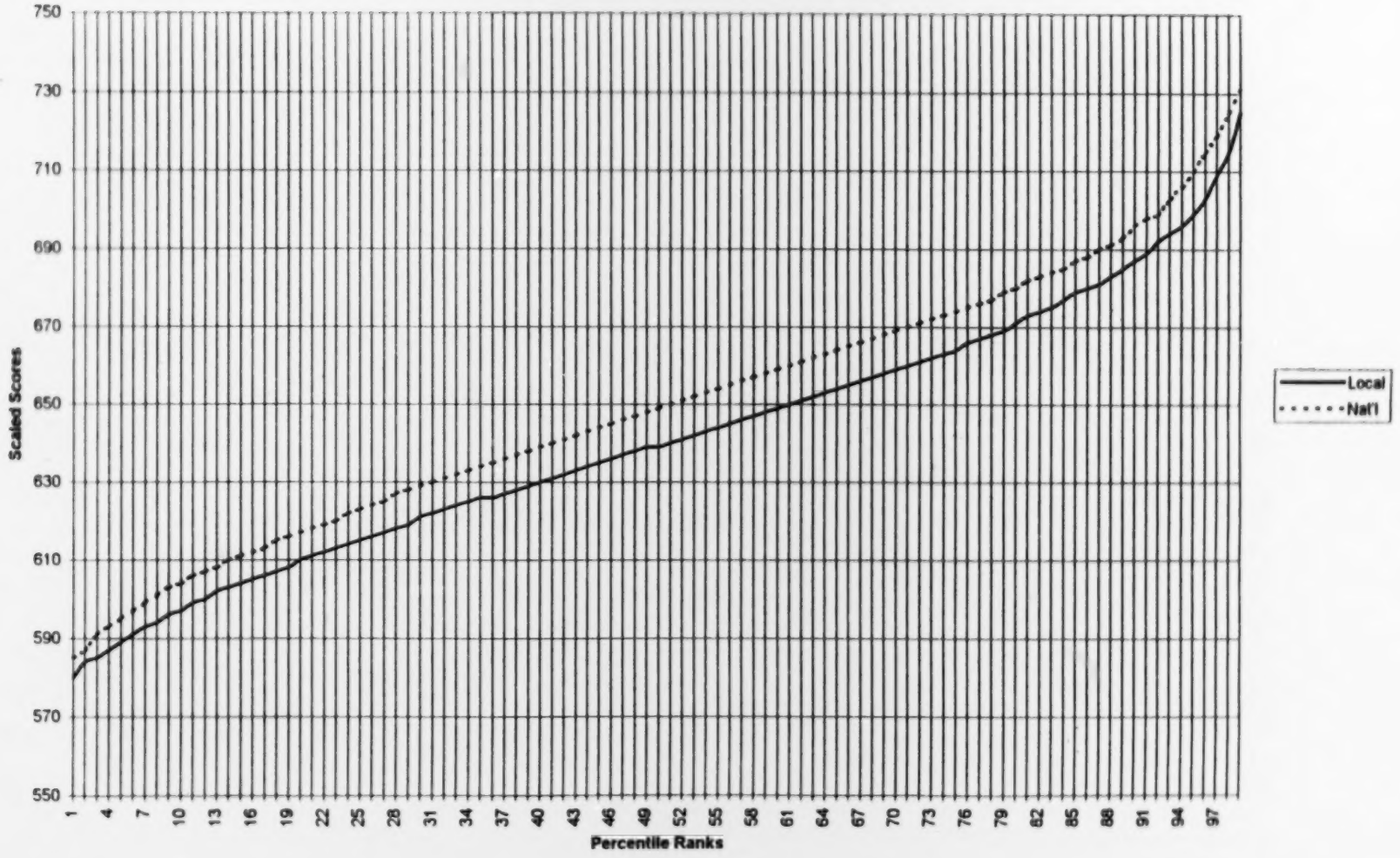
Grade 3 Reading
Comparison of Local vs National Norms



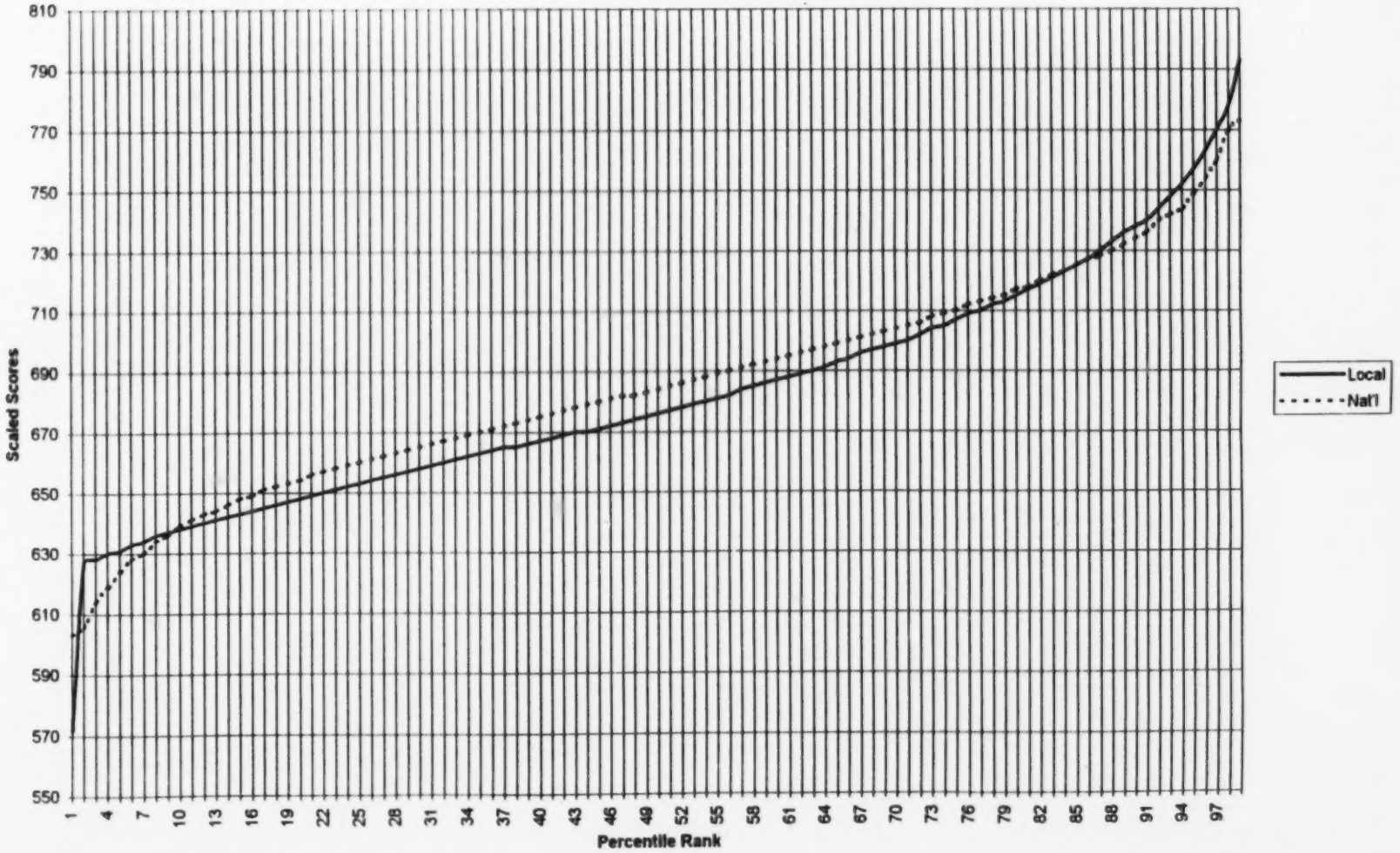
Grade 6 Mathematics
Comparison of Local vs National Norms



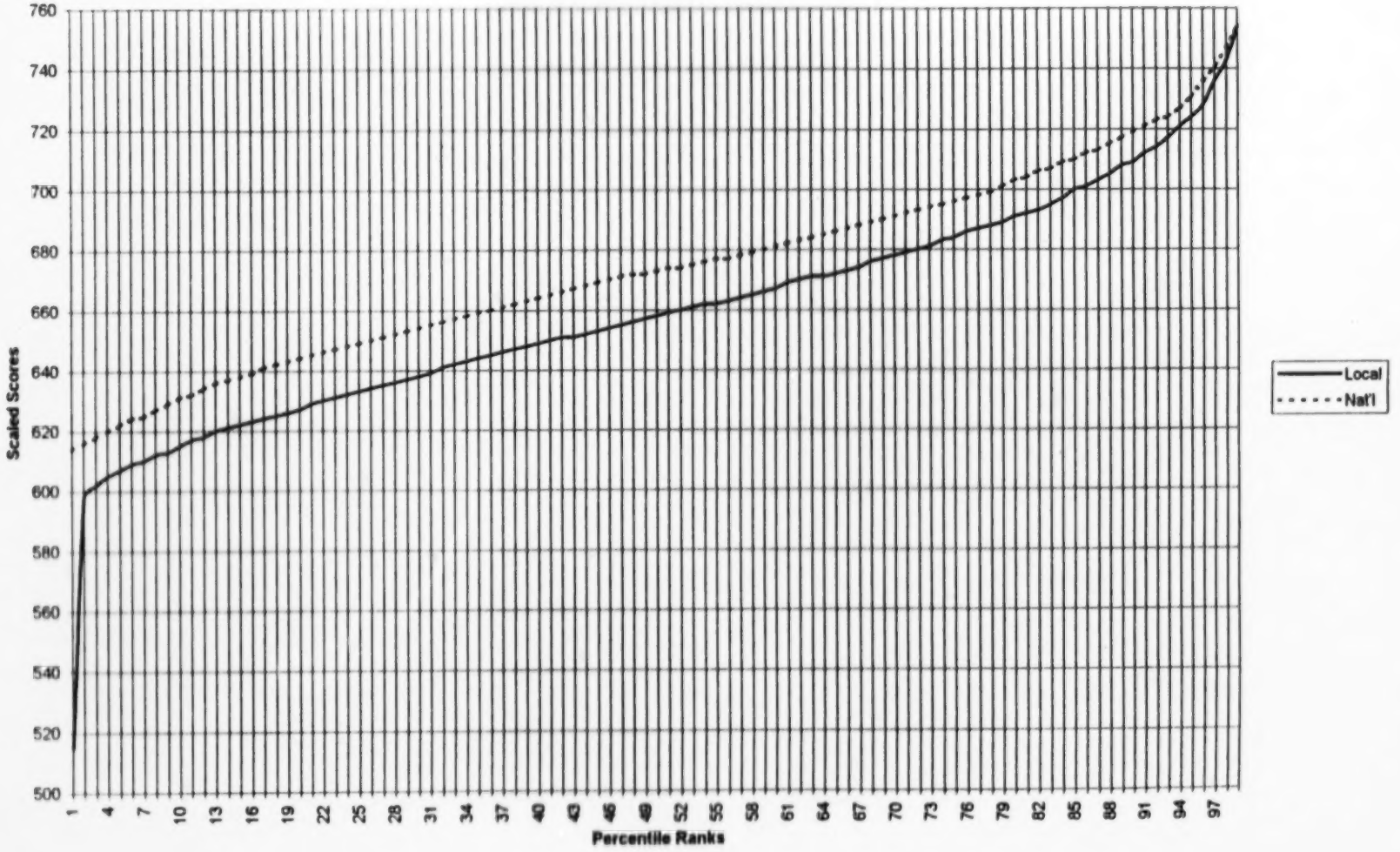
Grade 6 Reading
Comparison of Local vs National Norms



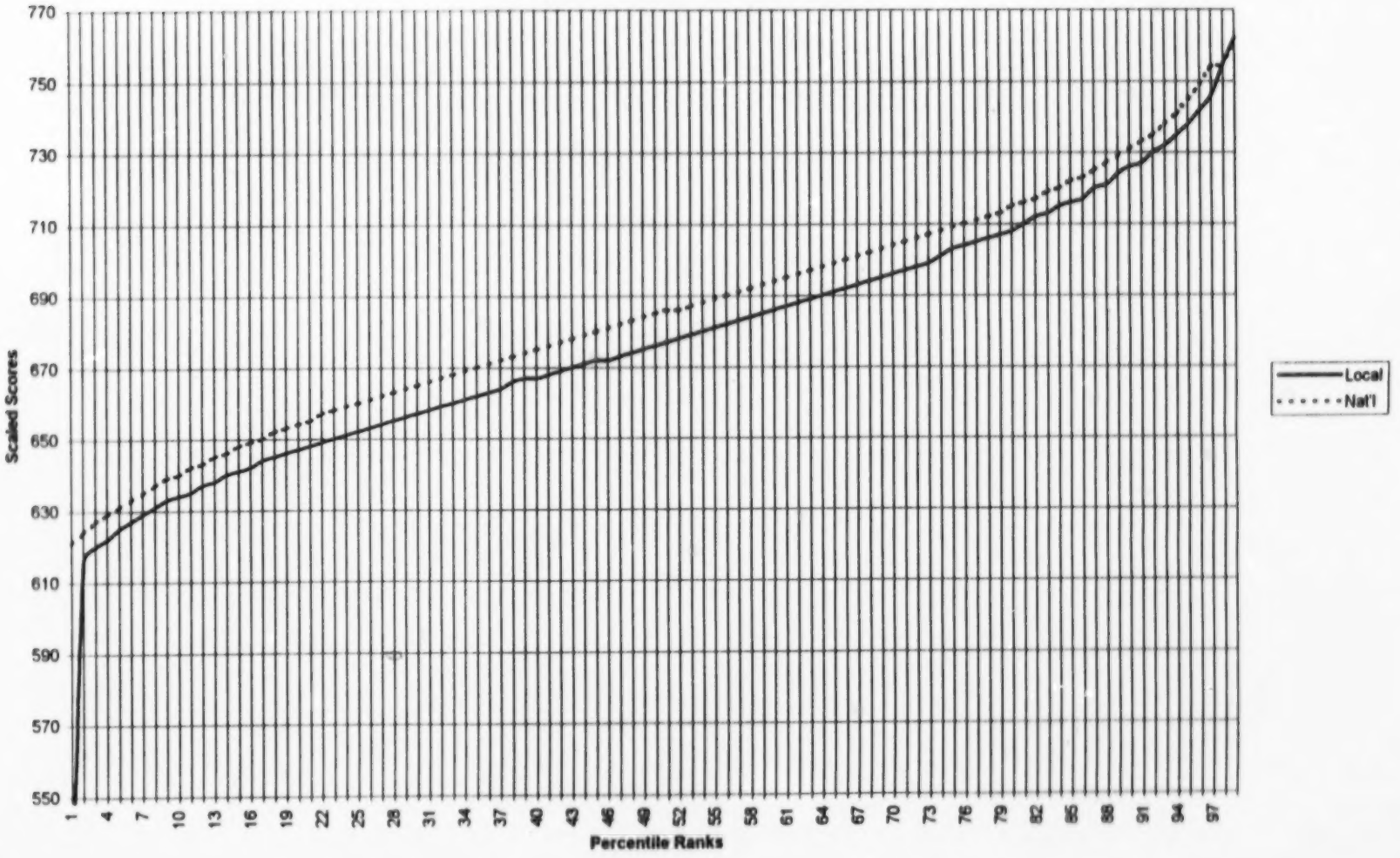
Grade 8 Mathematics
Comparison of Local vs National Norms



Grade 8 Reading
Comparison of Local vs National Norms



Grade 10 - Reading
Comparison of Local vs National Norms



Grade 10 - Math
Comparison of Local vs National Norms